

# Low Cost, High Efficiency, Pressurization System for Responsive Launch Operations, Phase I

Completed Technology Project (2012 - 2012)



## Project Introduction

KT Engineering (KTE) is pleased to submit this proposal to address the stated need for "innovative solutions that will allow spaceport launch service providers to operate in an efficient, low cost manner and increases capabilities associated with integration, checkout, and preparations required to configure and ready space systems for launch." We propose to conduct research and demonstrate feasibility of a novel launch vehicle pressurization system concept that will increase performance and reliability compared with traditional approaches, reduce dependence upon helium up to 50%, enable the use of low-cost commercial off the shelf technology, and demonstrate the automated ground processing associated with this technology. Our innovation is based on five major technology and operational elements including: 1) Tridyne Pressurant, 2) Distributed Storage and Control, 3) Cold Gas Storage / Warm Gas Delivery, 4) Bang-Bang Pressure Control, and 5) End-of-burn Tank Pressure Decay. Pump-fed launch vehicles will benefit from our innovative concept but the most significant benefits are achieved in cost-optimized pressure-fed systems such as KT Engineering's Radially Segmented Launch Vehicle (RSLV). We propose a six month Phase I program to refine the designs of the critical ground and airborne elements of this distributed pressurization system. We intend to demonstrate feasibility and more accurately quantify the benefits of our approach through analytical modeling, preliminary design, and high-flow, high-pressure testing of a prototype Tridyne catalytic reactor. The product of this effort will be engineering analysis and models, presentation materials from major reviews, a comprehensive final report, and our Phase II proposal. Under Phase II we will proposed to demonstrate design and operation of the ground and airborne elements of our pressurization system through prototype hardware fabrication and testing in the NASA KSC Launch Equipment Test Facility (LETF).



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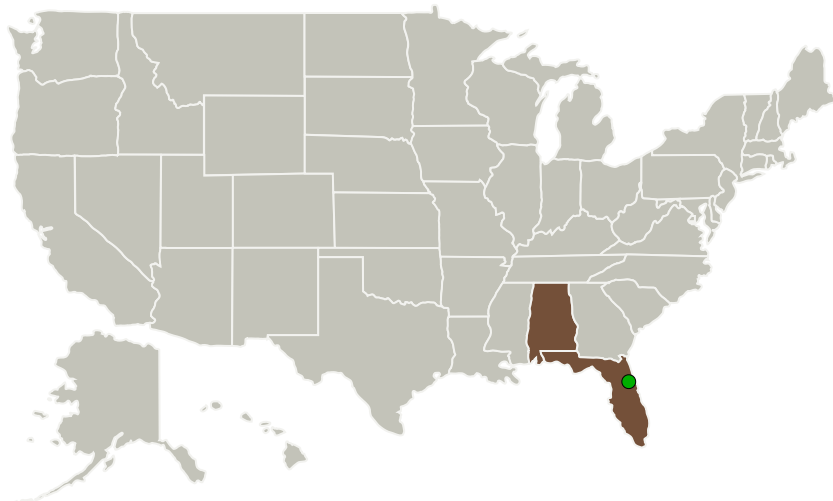
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
K T Engineering Corporation	Lead Organization	Industry	Madison, Alabama
● Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

### Primary U.S. Work Locations

Alabama	Florida
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## Project Transitions

**February 2012:** Project Start**August 2012:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138266>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

K T Engineering Corporation

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

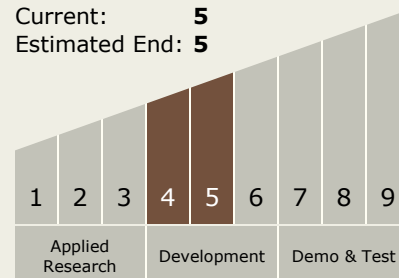
Carlos Torrez

### Principal Investigator:

Dave Sisk

## Technology Maturity (TRL)

Start: **4**  
 Current: **5**  
 Estimated End: **5**



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## Technology Areas

### Primary:

- TX14 Thermal Management Systems
  - └ TX14.1 Cryogenic Systems
    - └ TX14.1.2 Launch Vehicle Propellant

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System